ATTACHMENT 15

BRINE REDUCTION AREA MISCELLANEOUS TREATMENT UNIT

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1. BRA MISCELLANEOUS TREATMENT UNIT

1.1 Introduction

The Brine Reduction Area (BRA) miscellaneous treatment unit consists of two forced recirculation evaporator packages (each consisting of a flash evaporator, heat exchanger, and two circulation pumps) three brine drum dryers, and the BRA Pollution Abatement System (BRA PAS) equipment (knockout box, gas burner, baghouse, exhaust fan and stack). This equipment does not fit the definition of a container, tank, surface impoundment, waste pile, land treatment unit, landfill, incinerator, boiler, industrial furnace, or underground injection well. Therefore, this equipment is categorized as a miscellaneous treatment unit under the Resource Conservation and Recovery Act (RCRA).

This equipment is used at the Tooele Chemical Agent Disposal Facility (TOCDF) to treat brine/waste water from the Pollution Abatement Systems (PAS), Water Treatment System, and the BRA sumps. Each of the following incinerators has its own wet PAS: the Liquid Incinerators (LIC), Deactivation Furnace System (DFS), and Metal Parts Furnace (MPF). The brine/waste water from these sources are treated in the BRA. Treatment consists of removing water from the liquid brines to produce low moisture content salt. The goal is to reduce the water content of the salt to 5 - 20 percent.

1.2 Description of Miscellaneous Treatment Unit

The brine evaporator packages and the drum dryers are located inside the BRA in the Process and Utilities Building (PUB). Drawing TE-16-C-2 in Attachment 11 shows the location of the PUB in relation to other TOCDF buildings. The evaporators and the drum dryers are used to concentrate and dry the brines produced by the PAS for the DFS, the two LIC, and the MPF. The process brines are stored in four brine surge tanks located in the Brine Storage Area, which is a diked area adjacent to the west side of the PUB. One tank collects the brines as they are generated, while another feeds brine to the BRA as part of a batch process, where a batch equals the contents of one surge tank. A general process flow diagram for brine reduction operations is given in Drawings TE-2-F-501 and 502 in Attachment 11.

After one of the brine surge tanks is filled, the batch (tank contents) is sampled and analyzed in accordance with the Waste Analysis Plan (WAP) for corrosivity (pH), chemical agent, and specific gravity. The first tank of brine generated from a specific chemical agent incineration campaign, and at least annually thereafter, is also sampled for Health Risk Assessment (HRA) and Toxicity Characteristic metals and Toxicity Characteristic organics. The batch is treated after verifying through sampling and analysis that the brine is free of agent (below the Drinking Water Standard of 20 parts per billion (ppb) for nerve agents GB and VX, and below 200 ppb for mustard). The batch may be preconcentrated by circulation through an evaporator package and returned to the brine surge tank. Each brine surge tank is also equipped with a pump recycle line, through which brine may re-enter the tank after exiting the feed pumps. The batch may be fed through the evaporator package prior to being fed to the drum dryers, to increase the specific gravity. If the specific gravity is suitable, the brine may be circulated through the evaporator package (for heating) prior to feeding to the drum dryers.

Brine is pumped from the brine surge tank, via the brine feed pump, to the BRA. Before brine is sent to the flash evaporator, the circulation pump sends the brine to the heat exchanger. The heat exchanger heats the brine, which is then fed to the flash evaporator. The flash evaporator removes water from the brine, increasing its density and decreasing its volume. A small stream of fresh brine is bled into the much larger stream of concentrated brine to make up for the decreased volume; the combined stream is again fed through the heat exchanger using a circulation pump. As the brine continues to recirculate, a small stream of concentrated brine is bled off and either returned to the brine surge tank, or if further concentration is desired, sent to the drum dryers.

The drum dryers dry the concentrated brine to produce solid brine salts. Concentrated brine from the evaporator package is fed onto the two rotating drums within each drum dryer. Steam is provided to the inside of the rotating drums, which heats the drums and drys the brine. Water from the concentrated brine is evaporated, and brine salts cake onto the outside of the rotating drums. As the drums rotate, knife blades continuously scrape the salt cake from the drums. The brine salts then drop through collection guides (beneath the outside edge of the rotating drums) onto a conveyor, which moves the brine salt to a collection container stationed underneath the conveyor unloading point. There are two collection containers for each drum dryer, one on each side. When a collection container is full, it is closed and moved into the Residue Handling Area (RHA), adjacent to the BRA. An empty container replaces the full one. The full container is later emptied into a roll-off container for disposal offsite at a hazardous waste management facility.

The water vapor from the flash evaporators and drum dryers is sent through the BRA PAS and discharged to the atmosphere through an exhaust stack. The exhaust from each drum dryer flows separately to the knockout box, where larger particulate is removed. The combined exhaust from the drum dryers is heated by the BRA PAS gas burner, before merging with the exhaust from the evaporator packages. The baghouse modules, which operate in parallel, remove particulate from the combined exhaust of the evaporators and drum dryers. At least two of the four baghouse modules are on line when two evaporator packages and three drum dryers operate. The streams leaving the baghouse modules are combined before the exhaust enters the stack. The motive force for flow through the BRA PAS is produced by an induced draft (ID) fan, the BRA PAS exhaust blower.

Section 2 describes the miscellaneous treatment unit, including physical characteristics, materials of construction, equipment dimensions, equipment locations, operations and maintenance, monitoring procedures, inspection procedures, and closure. Section 2.6 addresses the design standards which mitigate the environmental impact of the miscellaneous unit, including waste types processed, containment, land usage, precipitation, air quality, ground water quality, and surface water quality.

2. BRINE REDUCTION AREA EQUIPMENT

2.1 Physical Characteristics

The evaporator packages and drum dryers are housed in the BRA of the PUB. Drawing TE-2-S-5 in Attachment 11 presents a floor plan of the PUB, and shows the location of major equipment. In addition to the two evaporator packages and the three drum dryers, the equipment used for the brine reduction operations include piping, instrumentation, and ancillary utility support equipment. RCRA drawings for the PUB, BRA, BRA PAS, and associated utilities and equipment are listed in Attachment 2. These drawings are found in Attachment 11 of the RCRA Permit.

2.1.1 Brine Reduction Area.

The floor of the BRA is an 8 inch thick concrete slab. Chemically resistant water stops are located under all construction joints. All joints are sealed with a heat resistant silicone sealant and then coated with a heat resistant and chemical resistant epoxy coating. The floor of the BRA slopes toward the two sumps. The concrete is designed to have a 28 day compressive strength of 4,000 pounds per square inch (psi).

The BRA measures approximately 85 feet wide by 82 feet long. The exterior west wall of the BRA is supported on a concrete grade beam, and all four walls are framed by steel columns. All columns are placed on concrete piers that are either notched into the grade beams or used to support the floor slab. The walls are made of steel columns on the interior and metal siding on the exterior.

The east and north walls are 1 hour fire rated walls; the south wall is a 2 hour fire rated wall. The west wall is an exterior wall, without a fire rating. The interior walls are made of metal studs and covered with gypsum board. The east wall is placed on a concrete dike that is 8 inch wide by 4 feet high, which provides containment for the adjacent Bulk Chemical Storage (BCS) area. The south wall is placed on a curb that is 6 inch wide by 5 inch high, which separates the adjacent boiler room.

The roof of the PUB is made of roof purlins spaced by sag rods. The ridge of the roof is above the east wall of the BRA and has a 2 percent slope toward the west wall. The ceiling of the BRA consists of composite building roof panels.

The floor, dike wall, and curbs are sealed with a heat resistant, chemical resistant epoxy coating used to prevent waste constituents from migrating into these structures. Should significant wear or unacceptable damage occur to sections of the floor, dike wall, and curbs, the effected areas will be re-coated based on manufacturer’s recommendations.

Doors in the BRA include one roll up door (14 feet wide by 12 feet high) and two personnel doors (3 feet wide by 7 feet high) in the north wall, two personnel doors in the south wall, and two exterior personnel doors in the west wall. The roll up doors are made of steel, and the personnel doors are made of hollow metal.

2.1.2 Equipment Installation

A written assessment has been done on the structural integrity and suitability of the evaporator packages and drum dryers, and ancillary equipment for handling hazardous waste. The assessment has been reviewed and certified by an independent, qualified, registered professional engineer. The registered professional engineer inspected the evaporator packages, drum dryers, and ancillary equipment prior to placing the systems in use. The BRA and BRA PAS equipment are included in the site Facility Construction Certification Reports.

2.1.3 Brine Feed System

The brine surge tanks, feed pumps, and strainers, which are not miscellaneous treatment units, interface with the evaporator packages and drum dryers. The brine feed system consists of four centrifugal feed pumps and associated piping that are use to transfer brine from the BRA surge tanks (BRA-TANK-101/102/201/202) to the BRA processing equipment. The BRA surge tanks are equipped with side mount agitators to prevent deposition of solids in the tanks. The pumps are made of cast chrome-nickel alloy material, and have double mechanical seals. Seal water used to cool the pump shaft is captured and recirculated. Steel pipes are used to transfer the brine from Brine Surge Tanks to the BRA. The brine from one brine surge tank is fed to a feed pump through a 2 inch pipe equipped with a simplex basket strainer, and exits the pump through a 1.5 inch pipe.

2.1.4 Brine Evaporator Packages

The brine evaporators are used to concentrate brine from the incinerator PAS. Each of the two evaporator packages (BRA-EVAP-101/201) consists of a flash evaporator vessel, two circulation pumps (one is a backup), a plate and frame heat exchanger, steam condensate tank, condensate pump, and associated piping, control systems, and instruments. Each flash evaporator and heat exchanger is designed and constructed in accordance with ASME Boiler and Pressure Vessel Code, Section VIII. Materials conform to the requirements of ASME Boiler and Pressure Vessel code, Section II, and welding procedures and qualifications are in accordance with ASME Section IX. Each flash evaporator meets ASME construction standards. Each heat exchanger is ASME Code stamped. The vessels and their supports are designed for Uniform Building Code (UBC) Seismic Zone 3 requirements. Piping within an evaporator package is Teflon (or equivalent) lined steel. A schematic diagram of the flash evaporator is provided in Attachment 11, Drawings TE-2-F-501 and 502. Table 2-1 presents the physical characteristics of the evaporators.

2.1.5 Brine Flash Chamber

The brine flash chamber (evaporator) is a vertical atmospheric vessel, with sufficient vapor space to reduce carry over of liquid droplets or salt particulate. The evaporator is constructed of 0.25 inch thick

Table 2-1
PHYSICAL CHARACTERISTICS OF BRINE EVAPORATORS
(FLASH EVAPORATOR VESSEL)

Miscellaneous Treatment Unit		Evaporator Identification Numbers: BRA-EVAP-101 and BRA-EVAP-201
Design Standard		ASME Section VIII, Division I (Unstamped)
Maximum Shut-In Volume, gal.		1,200
Maximum Liquid Level, ft		4.5 above bottom cone
Maximum Brine Density, lb/ft^3		74.9
Materials of Construction		Hastelloy with Additional Lining Plates of Hastelloy
Projected Corrosion Rate		10 mil/yr
Corrosion Allowance, in.		1/8
Calculated Shell Thickness, in.[a]		1/32
Recommended Shell Thickness, in[b]		1/4
Overall Dimensions, ft		4.5 dia., by 8.0 length
Brine Feed Rate, gpm		30 each (60 total)
Brine Discharge Rate, gpm		12
Duty, MMBtu/hr		7.497
Evaporation Rate	acfm	3,882
	lb/hr	7,958
Design Temperature, °F		270
Design Pressure, psig		15

[a] Calculated shell thickness is the minimum shell thickness necessary to adequately support the liquid in the tanks. It is calculated by taking into account liquid, design code, and construction material. It does not include corrosion allowances.

[b] Recommended shell thickness is corrosion allowance plus calculated shell thickness and then recommended at the next larger nominal plate size.

Hastelloy, partially lined with plates of Hastelloy. It is 8 feet long and 4.5 feet in diameter, with a conical bottom. The operating volume of the evaporator is approximately 450 gallons. Level transmitters, with isolation valves for calibration, are provided. The chamber is designed for operation at atmospheric pressure. Brine exits the flash chamber through a pipe to the circulation pump. The evaporation rate may be 7,958 pounds of water per hour, depending on the initial density of the brine.

2.1.6 Circulation Pumps

Each evaporator package is equipped with two circulation pumps, which are used to circulate brine to the heat exchanger. One of the pumps is spare. The centrifugal pumps are constructed of cast chrome-nickel alloy. The pumps circulate brine at a sufficiently high pressure to prevent brine vaporization in the heat exchanger. The pumps are equipped with 20 horse power (hp) motors. The maximum circulation rate for the evaporator package is 950 gallons per minute (gpm).

2.1.7 Brine Heat Exchangers

The heat exchanger in each evaporator package is a plate and frame type, containing 114 plates of eight square feet each. The material of construction is titanium-palladium modified. The exchanger is approximately 6 feet long and 1.5 feet thick. The heat exchanger is designed for 150 pounds per square inch gage (psig) steam at 300°F, but may be operated at lower steam pressure. The design feed rate from the BRA tank to the evaporator package is 30 gallons of brine per minute. Table 2-2 presents the physical characteristics of the heat exchangers.

The design maximum steam feed rate to the exchangers is 9,580 pounds per hour. Steam is supplied into the heat exchanger on the vapor side of the plates. As the steam condenses, heat is transferred to the brine flowing on the opposite side of the plates. Condensate collects in the bottom of the heater and is removed by the condensate pump. This pump returns the condensate to the deaerator. Level in the deaerator storage tank is controlled by an electrical level controller and valve combination.

2.1.8 Skid Support

The entire evaporator package (comprised of flash chamber, heat exchanger, and circulation pumps) is supported by a two level modular skid support. Each support consists of structural steel columns and wide flange beams conforming to ASTM-A36 that are welded together. Each of the two floor levels consists of galvanized steel grating, conforming to ASTM-A569. The flash chamber extends through both levels and is accessible to personnel from either level via a ladder. The skid support is on a five inch thick raised concrete pad, which is cast into the concrete floor slab. Drainage pipes embedded in the evaporator skid support are either plugged or connected through a drain header to the adjacent sump.

2.1.9 Transfer Lines

Table 2-2

PHYSICAL CHARACTERISTICS OF BRINE HEAT EXCHANGERS

Miscellaneous Treatment Unit		BRA Heat Exchanger Identification Numbers: BRA-EVAP-101 and BRA-EVAP-201
Design Standard		ASME Section VIII, Division I (Stamped)
Service		Brine (Part of Evaporation Loop)
Duty, MMBtu/hr		7.5
Operating Pressure	Steam, psig	5 to 125
	Brine, psig	28
Operating Temperature, °F		Ambient to 209°F(Brine Side)
Brine Density	lb/ft^3	73.3
	Viscosity, cp	0.5 to 2.0
	Feed Rate, gpm	1,000
Steam Feed Rate, lb/hr		9,580
Exchanger Type		Plate and Frame
Heat Transfer Area, ft^2		904
Steam Pressure, psig		150
Connections:	Brine, in.	6
	Steam, in.	4
	Condensate, in.	2
Materials of Construction		Titanium-Palladium Modified and/or Titanium TI-Code 12

Concentrated brine from the evaporator package or fresh brine that has bypassed the evaporator package is fed through 1.5 inch diameter Teflon lined steel pipes to a common header. The operator may increase the density of the brine by routing the brine through a 1.5 inch steel pipe (recycle line) that feeds back to the surge tank. Brine from the evaporator package is routed from the common header through 1.0 inch steel pipes to the drum dryers.

2.1.10 Drum Dryers

Three drum dryers are used to dry fresh brine and concentrated brine from the evaporator packages. Spent water softener regeneration brine may be sent to the drum dryers, or shipped offsite. Each drum dryer contains two rotating drums, 12 feet long by 3.5 feet in diameter. The drums are constructed in accordance with ASME Boiler and Pressure Vessel Code, Section VIII, Division 1. The drum surfaces are fabricated of high nickel cast iron, and are chrome plated. Brine is fed onto the drums. The liquid being fed may form a puddle or “nip” between the two drums. The nip is the volume of liquid that is held up between the two rotating drums and the end boards on either side. The nip contains up to 120 gallons of liquid.

Brine is fed to each drum dryer through a 1.0 inch steel pipe. The feed rate to each drum dryer is a maximum 16,000 pounds of brine per hour. The drum dryers have magnetic flow transmitters, which signal flow to the local control panel and the control room. Software totals the flow of brine, and the result is sent to the Process Data Acquisition and Recording System (PDARS). Each drum dryer also has an optional bubbler level control, which may be used by the operator to maintain brine at a 1 to 10 inch level on the drums.

The drums are heated by steam. Steam is provided through a 3 inch diameter steel pipe at an operating pressure of 135 psig. The 3 inch diameter pipe reduces to two 2 inch diameter steel pipes, which provide steam at 100 psig to the inside of each rotating drum. The maximum steam feed rate for each drum dryer is 3,881 pounds per hour. It is estimated that 1.1 to 2.5 pounds of steam are needed to evaporate one pound of water. Steam condensate leaves the drums through 1.5 inch diameter steel pipes and is recirculated to the boilers via the deaerator. A summary of the physical characteristics of each drum dryer is given in Table 2-3, and a schematic diagram is provided in Attachment 11, Drawings TE-2-F-501 and 502.

The drums in each drum dryer are separated by a small gap, which is approximately 1/8 inch. One drum is anchored and the other is adjustable, to allow for setting the desired separation distance between the drums. The drums rotate toward the center of the drum dryer. One drum rotates clockwise and the other rotates counterclockwise. The drums are driven by a 25 hp motor and rotate at 1-12 revolutions per minute.

Three 45 inch wide by 51 inch long by 10 inch deep stainless steel catch pans are located under each drum dryer, to contain any liquid that falls through the gap. Stainless steel plating and a butyl rubber skirt divert salt away from the structural steel beneath the dryers and to the catch pans. The capacity of each catch pan is 100 gallons. Liquid waste collected in the catch pan is either returned onto the drums or

Table 2-3
PHYSICAL CHARACTERISTICS OF BRINE DRUM DRYERS

Miscellaneous Treatment Unit		Identification Numbers: BRA-DDYR-101, BRA-DDYR-102, and BRA-DDYR-201
Design Standard		ASME Section VIII, Division I (Unstamped)
Maximum Nip Containment, gal.[a]		120
Maximum Pan Containment, gal.[a]		680
Materials of Construction		High Nickel Cast Iron
Projected Corrosion Rate[b]		10 mil/yr
Corrosion Allowance of Pan, in.[b]		1/8
Wall thickness of Pan, in.		1/4
Pan Dimensions, ft		7.0 x 12.0 x 1.33
Drum Dimensions, ft		3.5 dia., 12.0 length
Feed Temperature, °F		≤ 209°F
Feed Rate, gpm		1 to 6
Evaporation Rate (Approximate)	lb/hr	500 to 2,800
	acfm	1,322
Evaporation Duty, MMBtu/hr		2,554
Maximum Salt Production Rate, lb/hr		1,578.3
Salt Moisture Content, wt.%		5 to 20
Steam Conditions	Pressure, psig	0 to 150
	Temperature, °F	380
Steam Feed Rate, lb/hr		3,881
Inlet Air Temperature, °F		Ambient
Drum Rotation Speed, rpm		1 to 4 approx.

[a] Containment volumes are approximate because little brine is expected to be collected in the dryer during operations or idle periods.

[b] Corrosion allowance is an estimate because actual exposure times are not constant.

returned to the brine surge tank. Brine is returned when the catch pan becomes full, or at least daily (every 24 hours) when brine is processed. Each drum dryer is surrounded by a berm, which can contain 530 gallons.

A knife is used to scrape the brine salt cake from each drum. The knife is made of tempered steel and is 0.25 inch thick by 5 inch wide by 12 feet long. The pressure and angle of the knife are adjustable. The dried brine salts are scraped off the drums and fall through steel collection guides located beneath the outside edge of each drum. The salts are transported via enclosed conveyors to collection containers. The maximum brine salt production rate per drum dryer is estimated to be 900 pounds per hour, with a moisture content of 5-20 percent by weight.

A belt driven conveyor services each drum. Each conveyor is 12 inch wide and driven by a 1 hp motor. The conveyor belt is made of polyvinyl chloride and rides on stainless steel rollers. A wiper blade scrapes any residual brine salts off the underside of each conveyor. The entire conveying system is enclosed. A metal chute under the conveyor carries the salt from the end of the conveyor into the waste bin. Table 2-3 presents the physical characteristics of the brine drum dryers.

Each drum dryer is enclosed by a steel housing. The drum dryers operate under a slightly negative pressure, which is maintained by the ID fan of the BRA PAS stack. Air preheated to approximately 107^0F is drawn from the PUB preheater into the drum dryers through air plenums along the length of each side of the drum dryers. The exhaust gases from each of the three drum dryers flow through separate ducts to the knockout box, enter the BRA PAS gas burner as one combined stream, and merge with the exhaust from the evaporator flash chambers prior to entering the BRA PAS baghouse.

The drum dryers are supported by several concrete piers and are surrounded by a platform. The platform support is constructed of structural steel columns and wide flange beams that are bolted or welded together. All columns have cross-bracing. There is one main platform surrounding the drum dryers and several smaller, higher platforms at the ends of each drum dryer. Each drum dryer extends through the main platform. All platforms are made of galvanized steel grating. Ship style ladders and stairs are provided for personnel access, and a handrail is installed around the perimeter of the platforms. The steel column supports for the platform are located on concrete columns extending down through the floor slab and are supported on footings.

2.1.11 <u>BRA PAS</u>

The BRA PAS is designed to condition and collect contaminates from the three drum dryers and two evaporators. The main components of the BRA PAS are the knockout box, gas burner, four baghouse modules, exhaust fan and stack. In addition, equipment in the BRA PAS includes piping, instrumentation, and ancillary utility support equipment. This equipment is designed and built especially for the TOCDF BRA. The BRA PAS is designed to emit less than or equal to 0.01 grains of particulate matter (PM) per dry standard cubic foot (dscf). The opacity of the stream is designed to be 0%, as measured by 40 CFR 60, Appendix A, Reference Method 9.

The process gases from the three drum dryers are separately directed to the knockout box. Low pressure and temperature indicators in each duct determine process conditions during operation. At the knockout box, the gas stream is slowed to allow the heavier particulate and water condensation to leave the flow. This particulate and condensation are discharged through the knockout box hopper rotary airlock and a flexible connector to a sealed container. The particulate discharge is sealed to eliminate fugitive emissions. The knockout box is heated with eight 2.0 kilowatt (kw) heaters to reduce moisture condensation. As the gas stream leaves the knockout box, the velocity is increased to prevent any particulate from dropping out in the piping. The piping exits the PUB after the knockout box.

The exhaust gases from the three drum dryers, combined in the knockout box, are routed to the 10 million British Thermal Units per hour (MMBTU/hr) direct fired BRA PAS gas burner. The temperature of the dryer exhaust is raised to 225°F - 255°F by the burner. The fuel flow to the burner is regulated by a temperature control loop. The thermocouples are located no more than two duct diameters upstream of any branch to a baghouse module. After exiting the BRA PAS gas burner, the drum dryer gases merge with the moisture laden gases from the evaporators. The higher temperature prevents condensation in the system.

The gas stream is then drawn into the baghouse modules. There are four baghouse modules, each containing 210 bags. Two Three baghouse modules are normally in use during BRA operations. The gas stream is at least 225°F when it enters the baghouse. The gas stream is pulled through the filter bags where particulate matter is collected. The bags are made of Teflon coated polyester. The filtering efficiency rating is designed to be 99.99 percent for particulate that is equal to or greater than 0.3 micron. The automatic waste feed cutoff for baghouse differential pressure is 1.0 inches of water column. When the pressure drop across the bags reaches 4 inches of water, a compressed air pulse jet cleaning system is activated. The particulate drops from the bags to the bottom of the baghouse, where it is discharged through a rotary air lock. The rotary air lock is equipped with a 7 inch diameter, 4 foot long, flexible woven fiberglass hose. The hose empties into a sealed container. To eliminate fugitive dust emissions, the particulate discharge system is completely enclosed. The bottom of each baghouse module has sloped sides and electric vibrators to facilitate the discharge of collected particulate matter. Each baghouse module is equipped with eight 2.0 kw heaters to maintain internal baghouse temperature above the dew point.

The cleaned gases are discharged through the ID fan, which has a 200 hp motor rated at 53,288 actual cubic feet per minute (acfm). The gases are then discharged through the exhaust stack. The exhaust stack is 65 feet high with a 54 inch diameter at the exit point. All ductwork is designed with the minimum standard diameter that yields a gas velocity of no greater than 10,000 ft/min. The ductwork is routed to minimize the number and sharpness of elbows, in order to reduce particulate buildup. In addition, access ports have been provided to allow duct clean out.

Sample ports, an access ladder, and a platform with railing are provided for emission monitoring purposes. Two 4 inch sample ports are furnished. Each has a blind flange drilled, tapped, and fitted with a 2 ½ inch plug. In addition, two 2 inch sample ports and one 1 ½ inch port are furnished, each with a blind flange. Finally, five 4 inch environmental test ports are furnished, each with a blind flange. At least two of the environmental test ports are located at the same height, and at 90 degrees to each other.

All applicable controls, valves, and instrumentation necessary for the operation of the system are hard wired to the control panel. The BRA PAS is fully operational from the control panel. All key process instruments are displayed on the control panel. The stack is equipped with a flow probe. The flow is indicated on the control panel. If the flow drops below the design level, an alarm sounds. Alarms also sound if the temperature of the exhaust stream as it enters the baghouse is below 225°F, or if the temperature is greater than 275°F. A high temperature at the baghouse inlet automatically shuts down waste feed and the gas burner. The RCRA drawings for the BRA and BRA PAS are listed in Attachment 2.

2.1.12 BRA Building Sumps

There are two sumps/sump pumps located in the BRA. The sumps are located adjacent to the flash evaporators and provide secondary containment for any leakage from the evaporators, heat exchangers, and drum dryers. Each sump is 27 inch wide by 27 inch long by 27 inch deep. The sumps are made of 6 inch thick reinforced concrete, lined with 3/16 inch steel, and are covered with galvanized steel grates. Both the sumps and sump liners are coated with a chemical resistant epoxy. Each sump has a capacity of 80 gallons for a total capacity of 160 gallons. Each pump is constructed of cast iron. Brine collected in the sumps is pumped to one of the brine surge tanks for subsequent processing. The sumps are equipped with level indication monitors. If the sump liquid level increases to a certain level, an alarm sounds. The sump level and pump status are displayed on the control panel. In addition, operators may visually inspect the BRA equipment for leaks.

2.1.13 Steam System

The steam supply to the drum dryers and heat exchangers originates from the boilers in the PUB. Condensate generated during the drum dryer and evaporator operation is collected and returned to the boilers via the deaerator. Steel piping is used for the transfer of all steam and condensate.

2.1.14 Instrumentation

The evaporator packages and drum dryers are equipped with gauges and indicators on individual pieces of equipment. Local control panels provide for monitoring and controlling operation. Instruments on the evaporator packages, drum dryers, BRA PAS, and ancillary equipment (pumps, valves, etc.) are monitored and alarm at the local control panels. Alarms from each control panel are relayed to a common trouble alarm which signals at the Control Room. Temperature and pressure are also measured in the evaporator and drum dryer exhaust ducts. PDARS records select parameters for later analysis and the historical record.

The following parameters are monitored from instruments located on the equipment and manually recorded by the BRA operator.

Brine Surge Tanks
- Pump seal fluid level
- Feed pump discharge pressure

Heat Exchangers, Steam Entering
- Pressure
- Temperature

Evaporator Packages
- Temperature of brine entering flash evaporator
- Temperature inside flash evaporator
- Pressure inside flash evaporator
- Pressure of brine exiting flash evaporator
- Pressure of brine entering flash evaporator
- Pressure of brine to heat exchanger

Drum Dryers, Steam Entering
- Pressure

Brine Reduction Area Pollution Abatement System
- Pressure of fuel gas to burner
- Dryer Knockout Box heater temperature
- Burner flue gas flow (total)
- Baghouse inlet temperature

The following parameters are monitored from indicators on the local control panels and visually observed by the BRA operator.

Brine Surge Tanks
- Liquid level
- Pump seal fluid level (low)

Circulation Pump
- Seal fluid level (low)
- Motor Current

Heat Exchangers
- Brine temperature entering
- Brine density
- Steam flow rate to heat exchanger

Flash Evaporators
- Liquid level
- Brine flow rate entering evaporator package
- Brine flow rate leaving evaporator package

Drum Dryers
- Brine flow rate entering
- Liquid level in nip (high level)
- Speed of drum drive motors
- Conveyor motor status (overload)

Drum Dryers, Steam Entering
- Flow rate
- Steam pressure (low)

Brine Reduction Area Pollution Abatement System
- Dryer Knockout Box
- heater temperature (low)
- Burner
- Flame supervision status
- Baghouse
- pressure differential across bags
- Exhaust Blower
- motor current
- Stack
- exhaust flow rate

2.1.15 Electrical System

The PUB receives electrical power from the local utility. The power substation is located at the TOCDF. In the event of a power failure, all brine evaporation and drying operations and the BRA PAS will stop.

The Uninterruptible Power Supply (UPS) provides continuous power to critical loads during normal conditions and during a loss of utility power. Critical loads are those required immediately following a power interruption. Critical loads consists of computer systems, control room consoles, emergency lights, fire alarms, communications, and instrumentation for monitoring critical parameters of plant systems.

Emergency power is supplied to essential loads during power outages by one of the two emergency diesel generators. In the event of a power failure, the emergency generators will provide standby power to the following systems:

- Selected overhead lighting

- Instrumentation and control systems

- Fire protection panel (serving the heat detectors, visible warning lights, manual pull and automatic fire alarms)

- Public address system

2.1.16 Heating and Ventilation System

Outside air intake to the BRA is via three louvers on the west (exterior) wall of the BRA. Each louver provides a maximum of 28,000 cubic feet of air per minute and is equipped with an automatic damper. Air is exhausted through six roof mounted fans, rated between 15,000 and 28,000 cubic feet per minute (cfm). Each fan is equipped with a back draft damper. The BRA is heated by several ceiling mounted hot water heaters, and is not air conditioned.

The drum dryers are supplied with air preheated to about 107ºF by the PUB preheater. The exhaust from the drum dryers and evaporator packages is routed through the BRA PAS and then exhausted through the BRA PAS stack.

2.1.17 Fire Protection System

The fire detection system in the BRA consists of thermal heat detectors, which are mounted on the ceiling of the BRA and on the underside of the platform that surrounds the drum dryers. Upon detection of heat above 135°F, an alarm is shown on the fire protection panel in the PUB office and at the Control Room.

There are ABC type fire extinguishers at each exit door in the BRA. In the event that a fire is observed by personnel, two manual pull fire alarms in the BRA can be used to signal locally and at the Control Room. To let operators know that there is a fire in the area, a local alarm is given. When a manual pull alarm is activated in the BRA, an audible alarm (horn) sounds in every room of the PUB and a visual alarm (strobe light) activates inside the Boiler Room and the RHA.

2.1.18 Alarm and Communication Systems

The PUB, including the BRA, is equipped with telephones for site wide communication. Personnel are able to use this system to summon assistance in an emergency. The BRA is also equipped with loudspeakers and local telephone access to the public address system, which provides immediate means of contacting all personnel in the PUB in the event of an emergency. Fire alarms, initiated by the automatic heat detection system or the manual pull stations, are provided in the BRA. Instrumentation alarms signal on the local control panels in the BRA, and a common trouble alarm signals at the Control Room.

2.2 System Operations and Maintenance

2.2.1 General System Operation

Chemical agent is incinerated at the TOCDF in agent specific campaigns. Brine reduction operations in the BRA may be conducted 24 hours per day, 7 days per week. Brine generated during an agent campaign is pumped from one of the brine surge tanks to the BRA as a batch. The brine may be concentrated in the evaporator packages and recirculated back to the brine surge tanks, or the brine may be pumped to the evaporator packages to be heated, if necessary, and sent to the drum dryers. With both evaporators running, an isolation valve in the main line between the evaporators allows operators to have the option of directing brine from either evaporator to a specific tank. A list of RCRA drawings of piping and instrumentation for the miscellaneous treatment unit within the BRA is provided in Attachment 2. Brine reduction operations are further described in the following paragraphs.

2.2.2 Preparation of Brine

Before each batch of brine (contents of one surge tank) is released from a brine surge tank for treatment by the evaporator packages and/or drum dryers, it is sampled and analyzed in accordance with the WAP. The samples from each batch are analyzed for specific gravity, chemical agent, and corrosivity (pH). At the beginning of each chemical agent/munition campaign, and at least annually thereafter, brine is also analyzed for HRA and Toxicity Characteristic metals and Toxicity Characteristic organics. Sampling and analysis are further described in the WAP. The sampling and analysis results are appropriately documented and kept on file.

The expected ranges for each of these parameters of the brine are listed below. The amount of chemical agent present in the brine will be determined to be less than the Drinking Water Standard prior to sending the brine to the miscellaneous treatment unit.

- Specific gravity: 1.00 to 1.25
- Corrosivity: pH greater than 7
- Chemical agent: below Drinking Water Standard of 20 ppb for nerve agents GB and VX, and below 200 ppb for mustard (Required)
- Total Metals: below the limits as determined by the Health Risk Assessment and Toxicity Characteristic limits
- Total Organics: less than the Toxicity Characteristic limits.

Scrubber brines generated from the treatment of M55 rockets will additionally be analyzed for polychlorinated biphenyls (PCBs). Brines having more than 3 ppb of PCBs are a Toxic Substances Control Act (TSCA) regulated waste, and will be managed at a hazardous waste management facility.

The specific gravity measurements are used by BRA operators to monitor processing of the brine. The pH measurement is used to confirm compatibility with the treatment system. The analysis for total metals is used to verify compliance with the maximum metals feed rate. The Toxicity Characteristic organic analysis is used for proper waste characterization, and to verify that concentrations are below Toxicity Characteristic limits.

Spent scrubber brines will only be treated by the BRA miscellaneous treatment unit if the agent concentration in the brines is found to be below 20 ppb for GB and VX, and below 200 ppb for mustard. If chemical agent is present above these limits, caustic is added to neutralize the chemical agent. After determining the volume in the surge tank and the composition of the brine, the appropriate amount of caustic is added. This ensures that the resulting pH is compatible with the processing equipment in the BRA. After the caustic is added, the contents of the tank are mixed using agitation and again sampled and analyzed. When analytical results confirm that chemical agent is below the Drinking Water Standard, the brine is acceptable for treatment.

2.2.3 Brine Feed

For treatment, brine is pumped from one of the brine surge tanks into the BRA using a brine feed pump. Brine leaving a surge tank passes through a strainer before it reaches the feed pump. The brine is then sent to an evaporator package. However, the BRA operators may manually close a valve that allows brine to be fed to an evaporator package, and open a normally closed bypass valve. This allows brine to be sent directly to the drum dryers. Because the demand for brine from the evaporator packages varies, the brine discharged from the feed pump may be recycled back through a control valve to the brine surge tank being drained.

2.2.4 Evaporator Operation

The brine fed from the brine surge tank to an evaporator package is approximately 3 to 10 percent salt by weight. The heat exchanger is designed to heat the brine to a temperature within the range of 210°F to 225°F. The brine is sent to the flash evaporator, which operates at atmospheric pressure, and may be sent back to the heat exchanger. Once the brine is warm enough, water is "flashed" from the brine. A level indicator and transmitter in the flash evaporator regulates the flow of fresh brine into the stream of recirculating brine, to make up for evaporation losses from the flash evaporator and demand from the drum dryers for concentrated brine. A small stream of concentrated brine is bled off and either returned to the brine surge tank through the recycle line or fed to the drum dryers. Discharge from the evaporator package to the drum dryers is designed to be 8 gpm (with a steam supply rate of 9,580 pounds per hour to the heat exchanger). The concentrated brine discharged from the flash evaporator is approximately 8 to 36 percent salt by weight.

Brine exits the flash evaporator to the circulation pump. The centrifugal pump is used to circulate brine from the flash evaporator to the heat exchanger, or feed the concentrated/pre-heated brine to the drum dryers via a common header. Synthetic oil, which flows through a closed recirculation loop, provides cooling to the pump shafts.

The water vapor exhaust from the flash evaporator passes through a mist eliminator pad, which removes particulate and excess condensation from the water vapor before it is exhausted to the BRA PAS. A spray nozzle is used to periodically wash the mist eliminator pad using process water. A timer automatically switches on the washing mechanism at a set frequency (expected to be 10 minutes every 10 operating hours).

Pressure gauges are installed at the steam inlet and outlet of the heat exchanger. The gauges continuously measure the pressure differential across the heat exchanger.

If the differential pressure of the brine inside the flash evaporator exceeds 15 psig, a pressure relief valve will release steam to the evaporator catch basin. This safety feature is provided to protect the flash evaporator from rupturing, if this atypical event should occur.

2.2.5 Drum Dryer Operation

Within each drum dryer enclosure, the concentrated brine is fed unfiltered to the two rotating drums. Two end boards are used to contain the liquid between the drums. The end boards are held in place by two pneumatic rams, each supplied by an independent air regulator. The rams push a metal plate, which in turn pushes the endboards against the drum to contain the liquid. An angle iron stiffener and shims are used, to bow the plate away from the drums at the middle, which allows the board ends to be held firmly in place. The brine piping is raised, to allow brine to freely drain to the drum dryers without plugging the lines. Under some conditions, the liquid volume forms a nip. Flow or level control is used to govern nip level.

Liquid flow or level controls on the drum dryers regulate the feed of concentrated brine to make up for losses from evaporation in the drum dryer and salt cake removal. Steam is supplied at variable pressure to heat the inside of each of two drums as they rotate. As a result, salts in the concentrated brine cake onto the rotating drums. A knife blade scrapes the dried salts off the rotating drums. The brine salts drop onto an enclosed conveyor (one for each drum) which moves at approximately 1 to 4 revolutions per minute. The brine salts drop into lined collection containers, and a wiper blade on the underside of the conveyor scrapes any remaining salt product off of each conveyor. When a collection container is full, the conveyor is shut off, the full collection container is removed, an empty collection container is placed underneath the conveyor, and the conveyor is started again.

Steam pressure to the drum dryers is regulated by an automatic control loop. The pressure requirement for steam is a function of the brine feed rate. The pressure is adjusted at frequent intervals to achieve the necessary steam flow, especially during start up. A variable and frequently changing range of steam pressures are used. The controller is located in a position accessible to the operator, near the instruments being monitored.

A catch pan beneath the rotating drums catches any liquid or solids that may drop below the drums. Liquid waste collected in the catch pan is either returned onto the drums or a brine surge tank. Brine is returned when the catch pan becomes full, or at least daily when brine is processed. Solids are removed from the catch pans at least daily. Before solids are removed, the drum dryers are shut down, and are solids scooped/scraped out using a shovel or similar device. Solids are then placed into one of the collection containers at the drum dryer.

Full collection containers are sent to the adjacent RHA for disposition at an offsite hazardous waste treatment, storage, and disposal facility. For each chemical agent/munition campaign, the brine salt is sampled and analyzed, as described in the WAP, for agent concentration, corrosivity, Toxicity Characteristic metals, Toxicity Characteristic organics, and free liquids.

The drum dryers operate at a slightly negative pressure. Preheated air at approximately 107^{o}F is supplied to each drum dryer by the PUB preheater. The preheated air intake of each drum dryer varies from 11,000 to 16,000 cfm. Air and water vapor removed from the concentrated brine are exhausted through the vapor hood and then sent through the BRA PAS.

A portable hot water wash system is used to clean the drums. Excess wash water is collected in a drain trough running the length of the hood or in the catch pan. The wash water is pumped out of the drain trough and catch pan into a container using a hose and portable pump. Container contents are then pumped into the surge tank being filled.

2.2.6 Baghouse Operation

The BRA PAS baghouse filters particulate from the exhaust gas as it is pulled through the bag material by the ID fan. The exhaust is then discharged to the atmosphere through the BRA PAS stack. The baghouse consists of four modules. Normally, two operate in parallel. The maximum design discharge rate of the ID fan is 53,288 cfm. When two evaporator packages and three drum dryers are operating, the maximum flow rate is 53,068 acfm. The design minimum flow rate through the BRA PAS stack is 4,325 acfm. The minimum flow during operations occurs when one drum dryer is operating. Data on the exhaust flow to the BRA PAS is contained in Table 2-4, 2-5, and 2-6, which are based on the best available data from the JACADS facility. The operating pressure differential across each baghouse module is less than 5.0 inches of water column. If the pressure differential reaches 5 inches of water column, an alarm sounds locally and processing operations through that particular baghouse module are stopped.

Each module contains 210 bags. The rows of bags are cleaned in sequence per a preset cycle time. A pulse of compressed air causes the particles to be dislodged from the dirty side of the bags. The particles are collected in a hopper below the bags. The hopper is equipped with a vibrator, which is used to direct the particles through an airlock valve at the bottom of the hopper. From there, the particles fall into a collection container. The full containers are removed and transferred to the RHA.

If a high temperature exists at the inlet to the baghouse, the gas burner and waste feed to the evaporators and drum dryers are stopped. The baghouse will not be bypassed during brine processing. If the exhaust temperature prior to the baghouse drops to 225°F during processing operations, an alarm sounds on the local control panel to alert the operator that the exhaust gas is reaching its dew point.

Differential pressure instrumentation monitors the pressure drop across the baghouse modules, to effect waste feed cutoff if the differential pressure drops below the minimum set point on the modules in service. Individual baghouse modules are monitored for pressure drop at pre-alarm levels, to allow the baghouse to be taken off line for inspection and servicing, so that breakthrough does not occur. If low differential pressure due to a broken bag is indicated on the modules in service, the waste feed cutoff and system shutdown procedures are initiated.

2.2.7 Sump Operation

Any leaks or spills in the BRA inside the PUB flow to and collect in the two sumps. A liquid level indicator and transmitter at each sump are used to prevent overfilling or leakage. When a high liquid level is detected by the level indicator, an alarm signals. Each sump has an air driven diaphragm pump, with a local hand-off-auto switch. In auto mode, the pump is activated by a local level switch. The pumps discharge into a common header, which flows to the brine surge tanks. The sumps are visually inspected for the presence and level of liquid, once daily, when brine is processed.

2.2.8 System Shutdown

Shutdown of the system occurs for cleaning and maintenance of the equipment. If any of the situations identified in Permit Condition IX.D.4.a. occur, then the affected systems/equipment are automatically shut down.

Table 2-4
EXHAUST GAS FLOW TO BRA PAS
(FROM ONE DRYER)

A.	TEMPERATURE (°F)	121 ± 5
B.	TOTAL FLOW RATE	
(1)	acfm	10,968
(2)	scfm	8,214
(3)	lb/hr	36,140.6
C.	TOTAL WATER VAPOR FLOW RATE	
(1)	percent moisture (by weight)	8.1
(2)	scfm	1,027.2
(3)	lb/hr	2,926
D.	TOTAL DRY AIRFLOW RATE	
(1)	acfm	9,596.7
(2)	scfm	7,186.8
(3)	lb/hr	33,143
E.	PARTICULATE FLOW RATE / CONCENTRATION[a]	
(1)	lb/hr	71.6
(2)	mg/m^3	2,327
(3)	gr/dscf	1.15
F.	PARTICLE SIZE DISTRIBUTION (%) IN SALTS[a]	
(1)	>6.5 microns diameter	50.0
(2)	>1.5 & <6.5 microns diameter	38.3
(3)	> 0.5 & <1.5 microns diameter	8.7
(4)	<0.5 microns diameter	3.0

[a]Based on best available data from JACADS.

Table 2-5
EXHAUST GAS FLOW TO BRA PAS
(FROM ONE EVAPORATOR)

A.	TEMPERATURE (°F)	225 ± 5
B.	TOTAL FLOW RATE	
(1)	acfm	4,236
(2)	scfm	2,690
(3)	lb/hr	7,708.3
C.	TOTAL WATER VAPOR FLOW RATE	
(1)	percent moisture (by weight)	100.0
(2)	scfm	2,690
(3)	lb/hr	7,707.4
D.	TOTAL DRY AIR FLOW RATE	
(1)	acfm	Trace
(2)	scfm	Trace
(3)	lb/hr	Trace
E.	PARTICULATE FLOW RATE / CONCENTRATION[a]	
(1)	lb/hr	0.9
(2)	mg/m^3	89.3
(3)	gr/dscf	0.039
F.	PARTICLE SIZE DISTRIBUTION (%) IN SALTS[a]	
(1)	>6.5 microns diameter	50.0
(2)	>1.5 & <6.5 microns diameter	38.3
(3)	> 0.5 & <1.5 microns diameter	8.7
(4)	<0.5 microns diameter	3.0

[a]Based on best available data from JACADS.

Table 2-6
MAXIMUM EXHAUST GAS FLOW TO BRA PAS
(FROM THREE DRYERS AND TWO EVAPORATORS)

A.	TEMPERATURE (°F)	152 ± 5
B.	TOTAL FLOW RATE	
(1)	acfm	42,047
(2)	scfm	29,890
(3)	lb/hr	123,838.5
C.	TOTAL WATER VAPOR FLOW RATE	
(1)	percent moisture (by weight)	19.5
(2)	scfm	8,502.5
(3)	lb/hr	24,192.7
D.	TOTAL DRY AIR FLOW RATE	
(1)	acfm	30,773
(2)	scfm	21,387.5
(3)	lb/hr	99,429.1
E.	PARTICULATE FLOW RATE / CONCENTRATION[a]	
(1)	lb/hr	216.7
(2)	mg/m^3	1,935.5
(3)	gr/dscf	1.16
F.	PARTICLE SIZE DISTRIBUTION (%) IN SALTS[a]	
(1)	>6.5 microns diameter	50.0
(2)	>1.5 & <6.5 microns diameter	38.3
(3)	> 0.5 & <1.5 microns diameter	8.7
(4)	<0.5 microns diameter	3.0

[a]Based on best available data from JACADS.

Normal shutdown of equipment is conducted when the supply of brine in the brine surge tanks has been depleted, and no more is being generated, and following each chemical agent/munition campaign. The flushing of process water through the system leaves the system completely devoid of brine. Excess process water in the system is either evaporated and dried, or returned to the brine surge tank being filled.

Following normal shutdown, the operator performs a “walk through” of the area and visually checks/inspects equipment, pumps, and piping and leaks. Following an emergency shutdown, the operator follows this same procedure and also checks for spills and damage to or malfunction of the equipment. Observations are recorded and necessary corrective action is taken.

2.2.9 Maintenance

Maintenance of the evaporator packages, drum dryers, and ancillary equipment in the BRA consists of several procedures. Several of these maintenance activities are described in detail in following paragraphs. Instrumentation is calibrated at the startup of a system, as part of preventive maintenance at regular intervals, and after maintenance is performed.

Salts or residues deposited on the plates of the heat exchanger will increase the differential pressure across the heat exchanger. This residue may be removed by flushing with weak acids (e.g., citric acid three percent solution of hydrochloric acid (HCl), distilled vinegar, etc.). Any residual weak acids may be processed along with the brine, or shipped offsite to a hazardous waste treatment, storage, and disposal facility.

In addition to cleaning with weak acids, A mobile Cleaning Unit may be used to clean the heat exchanger. The unit recirculates a proprietary cleaning solution through the heat exchanger. The spent cleaning solution will not be managed in the BRA, but will be sent off-site for management at a permitted RCRA TSDF.

Each brine feed pump is protected by a strainer. The strainers are checked when a high differential pressure is indicated. If the differential pressure across a strainer is greater than recommended by the manufacturer, the strainer basket is cleaned. The contents from the clean out are emptied into a container. The container contents are sampled and analyzed as brine salts before packaging for further management.

All moving parts in the drum dryers are lubricated (check oil levels, oil feed rates, cleanliness of oil). Parts are maintained clean and free of salt and rust. These items are inspected daily, and maintenance is performed as indicated by inspection results. The drum dryer knife blade edges are machine honed. If salt build up occurs on the drum, the knife blade is replaced with a sharpened blade.

End boards are replaced if they leak significantly, and conveyors are replaced if the become worn or have tears. These items are inspected daily and maintenance is performed as indicated by inspection results. Drums are replaced if they become warped and bearings replaced if they do not adjust properly or become worn. These items are inspected daily. Before the drum dryers are started up, the gap between the drums is adjusted. If a uniform gap cannot be maintained, this indicates that the bearings are not adjusted properly.

The bags in the BRA PAS baghouse modules are replaced when they become worn, have tears, or have excess solidified salt material caked on the interior. The baghouse differential pressure readings are checked and recorded on a daily basis, and when a high differential pressure alarm across the baghouse modules is received.

Two access manways in the BRA PAS gas burner duct require removal at 90 day intervals for duct inspection. These covers are 32 inches in diameter, and weigh 285 pounds each. A swing arm is installed for handling the vertical cover, and a trolley is provided for handling the horizontal cover. With this equipment, a crane is not needed to remove the covers. The manway downstream of the BRA PAS gas burner has a catwalk and handrail installed along with a platform, so that the manway can be accessed from both sides of the duct work.

The electrical equipment in the BRA PAS is on one circuit breaker. In addition, a safety switch is provided for the motor of the combustion air blower to the BRA PAS gas burner. This provides a means of safe isolation of the motor for maintenance, without isolating power to the entire area.

The floor, curbs, sumps, and walls in the BRA are coated with a chemical-resistant epoxy coating. Should significant wear or unacceptable damage occur (large abrasions, penetrating cracks, or other damage that would compromise protection of the underlying concrete) the effected area will be re-coated based on manufacturer's recommendations.

2.3 Monitoring Procedures

The local operators in the BRA perform manual operations (principally from the local control panels) for system startup. During normal operations, an operator in the BRA monitors the local control panels at four hour intervals. Alternatively, a recorder is used to chronicle the value of some of the parameters identified below. The local control panels give readouts on the following parameters:

- Brine Surge Tanks
  - Liquid level

- Evaporator Packages
  - Liquid level in flash evaporator
  - Brine flow rate entering evaporator package

  - Density of brine entering heat exchanger
  - Steam flow rate to heat exchanger

  - Temperature of brine entering heat exchanger
  - Circulation pump motor current

- BRA PAS
  - Exhaust blower motor current
  -Differential pressure across baghouse modules
  - Stack exhaust flow rate

The following parameters, indicated on the equipment, are locally monitored and recorded every four hours by the BRA operators during normal operations:

- Brine Surge Tanks
  - Pump seal fluid level (percent)
  - Feed pump discharge pressure

- Evaporator Package
  - Pressure of steam entering heat exchanger
  - Temperature of steam entering heat exchanger
  - Pressure inside flash evaporator
  - Pressure of brine exiting flash evaporator
  - Pressure of brine to heat exchanger

- BRA PAS
  - Baghouse inlet temperature
  - Dryer knockout box heater temperature

In addition, the following parameters are recorded by PDARS and can be monitored from the Control Room:

- Brine Surge Tanks
  - Liquid level

- Evaporator Packages
  - Common trouble alarm from local control panel
  - Evaporator brine inlet flow
  - Evaporator flash tank level

- Drum Dryers
  - Total flow entering the drum dryers
  - Drum dryer brine level
  - Common trouble alarm from local control panel
  - Steam Supply pressure (Low)

- BRA Sump
  - Liquid level alarms (High and High-High)

- BRA PAS
  - Burner fuel total
  - High temperature at inlet of baghouse modules
  - P ressure across baghouse modules
  - Common trouble alarm of exhaust blower

The parameters which are critical to the control and operation of the BRA and its associated PAS are flow rate to drum dryers, temperature of exhaust gases entering the baghouse, pressure differential across each baghouse module, and the operation of the exhaust blower. These parameters are continuously monitored at the local control panels and are recorded in logs, either every four hours or every hour (as applicable) by the local operators. In addition, the total flow to the drum dryers is continuously monitored from the Control Room and continuously recorded by the PDARS. The temperature and pressure differential of exhaust gases entering the baghouse and the status of the exhaust blower are continuously monitored by process instrumentation and any alarms for high temperature, pressure differential, or failure of the exhaust blower are recorded by the PDARS. A local operator will contact the Control Room and notify the Shift Supervisor of abnormal or upset conditions. Operation common trouble alarms and fire alarms annunciate at the Control Room, as well as locally.

Brine is sampled and analyzed for specific gravity, chemical agent, corrosivity (pH), total metals, and Toxicity Characteristic organics as described in the WAP. In addition, the Monitoring Branch operates Depot Area Air Monitoring Systems (DAAMS) in the BRA to detect agent in the area. The TOCDF monitoring branch has prepared a detailed monitoring plan, which is referenced in Attachment 15-3. Also, CAMDS personnel operate a perimeter monitoring network around TOCDF and CAMDS. This network uses DAAMS to detect the presence of agent. This perimeter monitoring is done to insure that no agent is contained in ambient air around the facilities. Figure 2-1 shows the locations of the perimeter monitoring stations at the Tooele Chemical Activity.

2.4 Inspection

Table F-2-1 of Attachment 5 to the RCRA Permit contains the inspection requirements and schedules for the BRA tanks, evaporator packages, drum dryers, and BRA PAS. The table lists the items to be inspected, the types of problems which may be found, and the inspection frequency. The environmental inspection logs for these systems are also in Attachment 5 of the RCRA Permit. A list of these documents is shown in Attachment 15-4 of this document.

2.5 Closure

General procedures and techniques to complete closure of the TOCDF (including the associated structures and equipment) are in Attachment 10 (Closure Plan) of the RCRA Permit. This attachment includes descriptions of the anticipated closure procedures and decontamination methodologies for the different contaminated matrices/surfaces. Specific descriptions and procedures are described below.

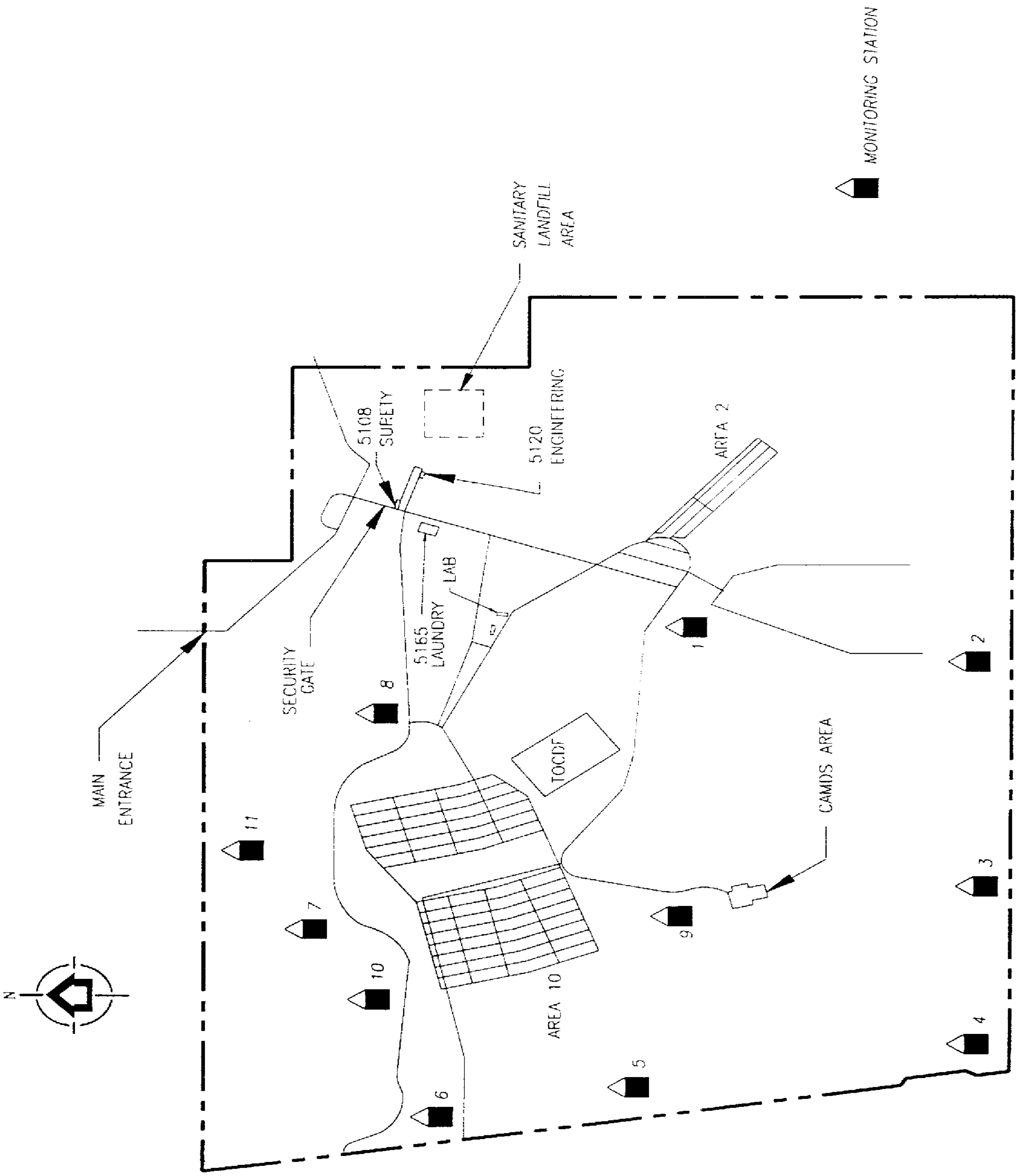

Figure 2-1
Location of Perimeter Monitoring Stations at the Tooele Chemical Activity

The BRA equipment includes four surge tanks, two evaporator packages, three drum dryers, and the BRA PAS, as well as piping and ancillary utility equipment. The BRA PAS includes a knockout box, gas burner, four baghouse modules, process piping and controls, exhaust fan, and stack. The evaporators, drum dryers, and knockout box are housed in the PUB. The PUB has a concrete slab floor, coated and sealed with chemical resistant epoxy. Figure 2-2 depicts a schematic of the exhaust flow and the BRA PAS.

As the BRA is used to concentrate and dry brines produced by the PAS from the various TOCDF furnaces (DFS, LIC, and MPF), closure of the BRA will take place only after operations at the furnaces have ceased. Consequently, the BRA and associated equipment will be one of the last units to be closed at the TOCDF.

Upon closure, all metal process equipment will be decontaminated using physical (e.g., grit blasting) and/or liquid residue removal as described in Attachment 10 (Closure Plan) of the RCRA Permit. The equipment will be disassembled, brushed, scraped, or grit-blasted, as appropriate, to remove any heavy residue (e.g., brine) accumulation, and then washed or steam-cleaned using solutions as described in Attachment 10 of the RCRA Permit. After decontamination is completed, the equipment will be cut into small pieces, where practicable, and released from Government custody as scrap metal. Following removal of the equipment in the PUB, the interior surface and floors will be decontaminated. Decontamination will consist of high-pressure water washing and/or steam cleaning, using the appropriate cleaning / decontamination solution described in Attachment 10 of the RCRA Permit.

Non-metal wastes (including grit-blasting residues) and bags will be collected, containerized, and appropriately identified as either a hazardous or non-hazardous waste. Hazardous wastes will be appropriately managed and shipped to a hazardous waste treatment, storage, or disposal facility.

2.6 Design and Operating Standards

The evaporator packages, drum dryers, and ancillary equipment in the BRA have been designed and are operated in a manner to reduce the risk of waste constituents entering the environment. The evaporator packages and drum dryers are located inside the PUB, which has concrete floors and curbs, two concrete sumps, steel studded walls, and a roof. This building protects the evaporator packages and drum dryers from precipitation, thereby precluding precipitation run on and the potential for contaminated runoff. Specific design features include a concrete slab with a heat resistant, chemical resistant epoxy coating, which forms an impermeable surface. Set into the concrete slab are two steel-lined coated sumps. These sumps collect any leakage of the brines outside of the processing equipment in the event of failure of processing or ancillary equipment.

Monitoring instrumentation, control mechanisms, alarms, fire protection, and communications are present in the BRA. These are discussed in detail in the previous sections.

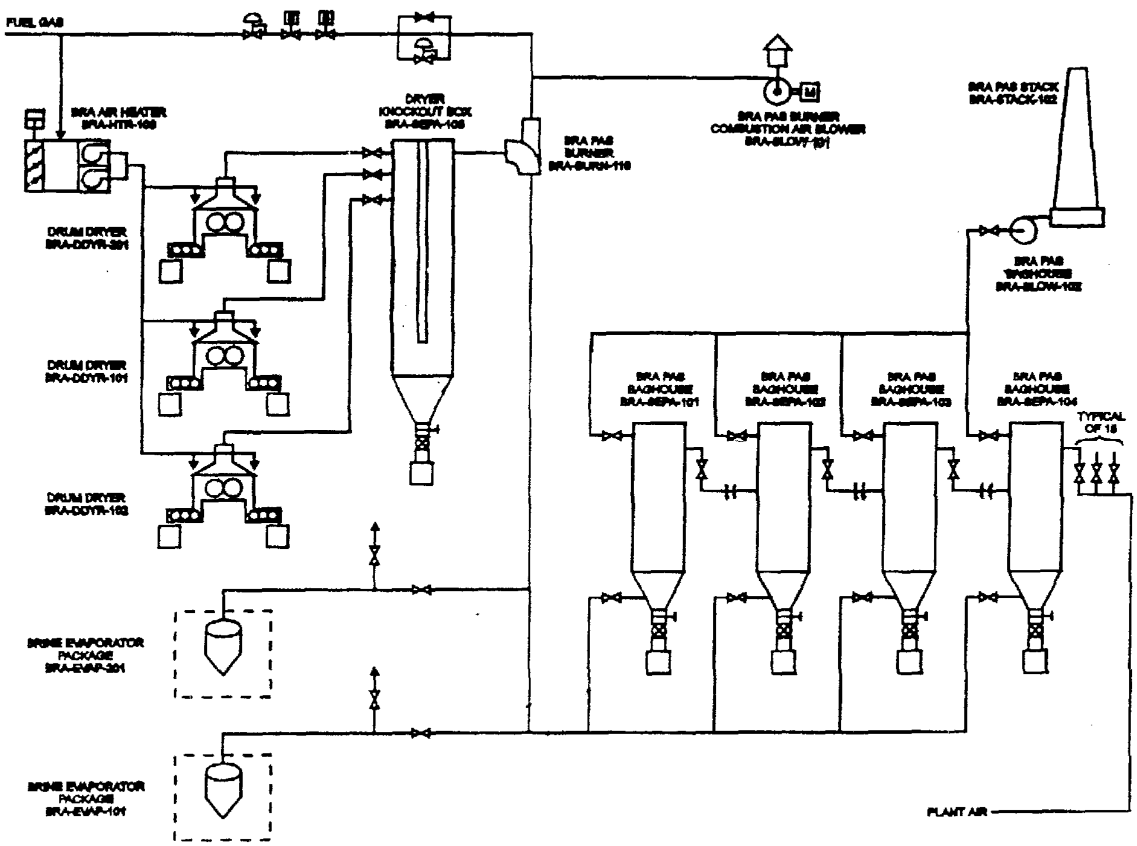

Figure 2-2
Schematic of the Exhaust Flow and BRA PAS.

Any brine collected in the sumps is pumped to the brine surge tanks. There are also catch pans beneath the rotating drums of the drum dryers, to keep liquids and solids from being released. Furthermore, the conveyors in each of the drum dryers are enclosed. The materials of construction for the pumps, flash evaporators, heat exchangers, drum dryers, and ancillary equipment are compatible with the brines to be processed.

The piping system is equipped with valves to isolate strainers for change-out during operations. The duplex strainers allow the stream of brine to flow through one side of the strainer while the other side is changed out. These design features minimize releases of any brine from the lines during change-out procedures.

Aside from the design features described above, operations personnel follow various procedures to reduce the risk of waste exposure to personnel and the environment. These procedures include:

- Testing brine to confirm absence of chemical agent prior to processing.
- Testing feed brine for total metals and brine salts for Toxicity Characteristic metals.
- Pressure testing pipe lines to ensure that there are no leaks (upon installation of system and after repairs)
- Emptying the catch pans below the drum dryers daily.
- Periodically monitoring key process parameters from the BRA, and trouble alarms at the Control Room
- Visually examining the processing area and equipment at least once hourly.

During brine reduction operations, operating personnel in the BRA are required to wear Level E protective clothing and carry an air purifying respirator. Level E protective clothing is worn by operating personnel who would only be exposed to agent in the event of an accident. Level E consists of issued clothing, including coveralls and safety shoes, and carrying the air purifying respirator. A High Efficiency Particulate Air (HEPA) filter is worn when protection is needed from brine salt dust. A full face respirator is worn for protection from brine mist.

Prior to shutdown of the systems following their use, process water will be fed through the system to flush the lines, hoses, and equipment of any residual waste. Excess process water will either be evaporated/dried or returned to the brine surge tank being filled. Periodic cleaning of the flash evaporator interiors and the drum dryer surfaces is performed on an as needed basis, using standard industrial practices.

The air and water vapor exhausted from the flash evaporators and drum dryers passes through the BRA PAS before entering the atmosphere. The BRA PAS is designed to remove particulate matter to 0.3 microns. Additional details on the BRA PAS are provided in Section 3.3.4.

3. ENVIRONMENTAL PERFORMANCE STANDARDS FOR BRA MISCELLANEOUS UNIT

Brines from a variety of TOCDF equipment are treated using the evaporator packages and drum dryers. The miscellaneous treatment unit is located, designed, and operated in a manner to preclude the release of hazardous chemical constituents that may have adverse effects on human health or the environment. The following sections describe the potential pathways of waste constituent release, the potential impact of such releases, and the features of the location which minimize potential risks. Information is also given on the design and operating procedures which minimize the potential for a release of waste during treatment.

Section 3.1 addresses the waste treated by the miscellaneous treatment unit. Section 3.2 addresses the secondary containment systems for the evaporator packages and drum dryers. Section 3.3 describes air quality at and around the TOCDF. Section 3.3.4 addresses the prevention of air emissions. Section 3.4 describes how the miscellaneous treatment unit is operated to prevent the release of hazardous constituents to the air. Section 3.5 addresses the hydrologic conditions for TOCDF. Site precipitation information is provided in Section 3.6. Groundwater and surface water issues are addressed in Section 3.7 and 3.8 respectively. The land uses for the area surrounding the TOCDF are discussed in Section 3.9. The potential for waste constituents to migrate from the miscellaneous treatment unit and the potential human health and environmental risks are discussed in Section 3.10 and 3.11, respectively.

3.1 Miscellaneous Unit Waste Streams

The brines to be processed in the BRA are primarily derived from the incinerator PAS, as discussed in Section 2. The types of munitions, bulk containers, and chemical agent contaminated media accepted for incineration are described in the WAP. Table 3-1 shows the approximate concentrations of the brines generated from the incineration of several types of munitions/chemical agents. The brine is expected to contain inorganic salts (primarily sodium salts of fluoride, chloride, sulfite, sulfate, phosphate, carbonate, and nitrate), organic carbon, and metals. The pH of the brine is expected to range from 5.5 to 10; therefore, the brine will not be corrosive as defined by RCRA.

The brines will not be reactive or corrosive, as defined by RCRA. Thus, the brines processed are compatible with the materials of construction for pumps, flash evaporators, heat exchangers, and drum dryers (including rotating drums, knife blades, conveyors, and catch pans). Moreover, allowances for corrosion and erosion in material thickness, weld overlays, linings, and coatings provide additional protection against deterioration. In addition, the brines processed are compatible with the epoxy coating of the concrete floor, sump, and curbs, as well as the equipment support structures in the BRA.

Brine to be treated in the BRA is not expected to contain any significant amount of organic chemicals that could volatilize or evaporate into the atmosphere. The evaporator packages and drum dryer systems are designed and operated in a manner that prevents any significant release of wastes to the atmosphere. All brine entering the BRA is fed to individual processing units through steel or Teflon lined steel pipe. The evaporator packages and drum dryers are enclosed, and the exhaust stream from each is sent through the BRA PAS. Prevention of air emissions is described further in Section 3.3.4.

Table 3-1 CALCULATED PARTICULATE COMPOSITION (WEIGHT PERCENT)[a]

SALT COMPONENTS	GB	VX	H	HD	HT	SOFTENER WASTE
NaOH	0.869	0.022	0.007	0.008	0.009	0.000
$NaHCO_3$	2.854	4.823	1.540	1.876	2.080	0.000
$NaNO_3$	0.013	0.022	0.007	0.008	0.009	0.000
Na_2SO_3	0.000	40.076	56.788	46.890	51.997	0.000
NaCl	3.113	11.186	40.174	49.472	43.944	66.743
NaF	22.675	0.000	0.000	0.000	0.000	0.000
Na_2HPO_4	68.932	41.215	0.000	0.000	0.000	0.000
Metal Chlorides	1.544	2.657	0.822	0.966	1.085	33.257
Metal Hydroxides	0.000	0.000	0.663	0.779	0.876	0.000

[a]Based on BRA mass and energy balances

3.2 Containment System

Secondary containment for the evaporator packages and drum dryers is provided by the sloped concrete floor and sumps in the BRA. Along with curbs and dikes at the perimeter of the BRA, the floor of the BRA will contain approximately 12,000 gallons. The two sumps have a capacity of 80 gallons each, for a total capacity of 160 gallons. Each drum dryer is surrounded by a berm, which can contain 530 gallons. The evaporator packages and drum dryers are located indoors in the PUB. The area around the building is graded and paved to promote drainage away from the building. Joints in the concrete are sealed with heat resistant silicone sealant, and the floor is sealed with an epoxy coating to prevent infiltration of any waste that may be released.

In the event of a spill or leak of brine, the spilled waste materials are drained to and collected in the sumps. The presence of material in the sumps is detected and monitored by a level indicator. Sump pumps transfer pumpable quantities of brine directly to the brine surge tanks. Non-pumpable brine residues are removed manually by personnel wearing appropriate protective clothing. The design and construction of the sealed concrete floor and the lined and sealed sumps preclude the chance of hazardous wastes or chemical constituents from migrating to surface water, soil, or groundwater.

3.3 Site Air Conditions

The following paragraphs describe the atmospheric, meteorologic, and topographic features that affect ambient air conditions at TOCDF. Note that because any chemical agents and other organic constituents have already been destroyed, the BRA only treats brine solutions.

3.3.1 Topography

Attachment 1 of the RCRA Permit contains a topographic map of the facility, a wind rose plot from data collected at the Tooele Chemical Activity, and a site plan. Figure 3-1 is a copy of the site wind rose.

3.3.2 Meteorologic and Atmospheric Conditions

The climate in the area can be characterized as a semi-arid continental climate, which is heavily influenced by the surrounding mountains. Temperatures vary considerably between daytime and nighttime hours, and between seasons. During November through March, minimum temperatures can drop below -18°C (0°F). Temperatures below -23°C (-10°F) are possible during December through February. The area is noted for plentiful sunshine, low relative humidity, and light precipitation.

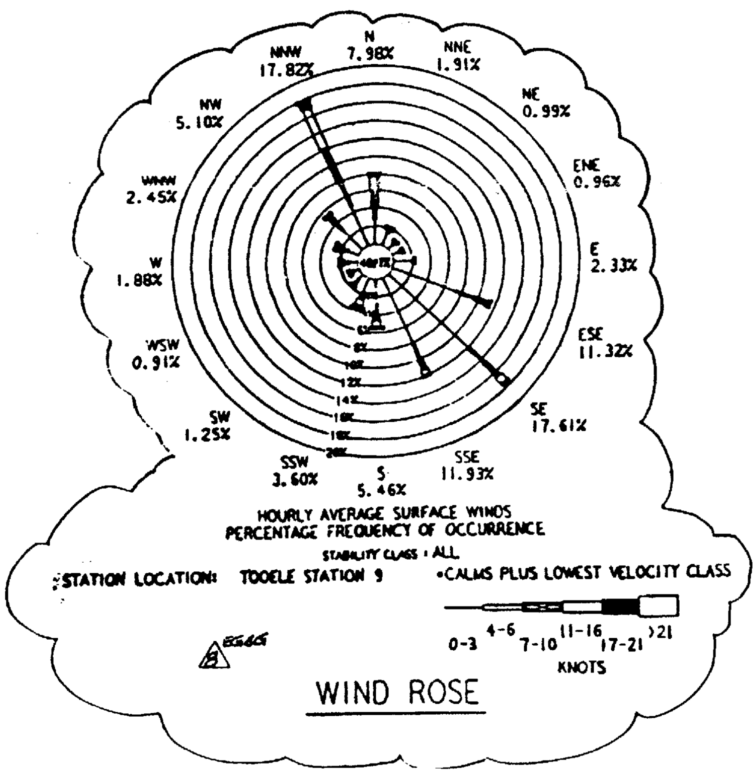

Figure 3.1
Average Annual Wind Rose for Tooele Chemical Activity

April is the wettest month, with an average of 2.00 inches of rain. July is the driest month, with an average of 0.64 inches. Snow averages 40 inches per year, with the maximum (13.2 inches average) in January, and snowfall greater than 1 inch during each month from October through April. The prevailing winds are from the southeast at the Tooele Chemical Activity, with high occurrences of wind from the adjoining south-southeast and east-southeast directions. A secondary peak occurs from the north-northwest direction. These directions align with the orientation of the mountain ranges on either side of the depot.

3.3.3 Prevention Of Air Emissions

Emissions from the BRA evaporator packages and drum dryers are controlled by the BRA PAS. The exhaust from the drum dryers is sent through a knockout box to remove large particles. The combined exhausts from the evaporator packages and drum dryers then flow through a baghouse for particulate removal. The BRA PAS removes particulate (entrained salts) from the exhaust stream to a level of 0.01 grains per dry standard cubic foot or less. A more detailed description of the BRA PAS is provided in the following paragraphs.

The exhaust air from the three drum dryers flows to the knockout box, where particulate is removed from the air stream. The air stream next moves to the BRA PAS burner system, which heats the air stream to prevent condensation in the baghouse. The burner is able to operate at modulating rates, as needed. After heating, the drum dryer exhaust joins with the evaporator exhaust air. The combined exhaust stream passes through the baghouse modules, which operate in parallel. A high temperature at the baghouse inlet shuts down the gas burner and waste feed to the evaporators and drum dryers.

The baghouse is located adjacent to the PUB, at the BRA PAS location. The filter efficiency is designed to be 99.99 percent for particulate that is equal to or greater than 0.3 micron. Air pulse jets shake collected material off the bags, and a vibrator facilitates collection of removed particulate. The particulate accumulates in a collection container at the base of each baghouse module. When full, the container is removed and transferred to the RHA for disposition. The collection system is equipped with a dust shroud for fugitive emission control.

The pressure drop across each baghouse module provides an indication of the need to replace bags, other maintenance needs, or performance problems. Monitoring the pressure drop across the bags provides a good indication of particulate emissions being emitted through the baghouse. A pressure drop below the designed operating range signifies that the particulate control efficiency in the baghouse is decreasing, and that maintenance is required. The pressure drop in the baghouse is closely monitored by the operators. After the pressure differential across any one baghouse module falls below 1 inches of water column, the individual baghouse module will be shut down and the problems addressed.

After exiting the baghouse, the air stream is exhausted through the BRA PAS stack. Sampling ports are provided for use in compliance testing. The ID fan (the exhaust blower) draws the evaporator package and drum dryer exhaust gases through the BRA PAS.

In addition to the BRA PAS, several operational procedures are used to minimize the potential for hazardous emissions to the air while treating the brine in the BRA:

- Brine is sampled for specific gravity, chemical agent, corrosivity (pH), total metals, and Toxicity Characteristic organics. Sampling frequencies and analytical methods are presented in the WAP. This serves as a check that the brine characteristics are compatible with BRA equipment, and that no unreacted chemical agent is fed into the BRA system.

- Brine is fed to the evaporator packages and drum dryers through steel piping.

- Collected brine salts from the drum dryers are transferred to collection containers by enclosed conveyors.

- A surveillance is made by an operator at least once every four hours during operation, to check for spills, leaks, system condition, and proper system operation. Collection container brine salt levels are regularly checked when brine reduction operations are in progress.

The performance and emissions of the BRA PAS will be evaluated during the Compliance Test. Stack sampling of the BRA PAS is planned to determine metals and chlorine emissions, and to verify that no unacceptable risk is posed by brine reduction operations. Compliance tests will be used to validate treatment effectiveness and to demonstrate that air emissions are below the health-risk based emission limits.

3.3.4 Expected Air Emissions/Justification for Operating BRA Prior to Testing

Performance tests have been performed on the Johnston Atoll Chemical Agent Disposal System (JACADS) BRA in October 1993 and December 1994. Both performance tests indicate that the particulate, hydrogen chloride, and metal emissions from the operation of the BRA are well below the EPA limits for those pollutants. Attachment 5 contains a description of the JACADS Compliance Test.

Since the TOCDF BRA design is based on the JACADS BRA design, the air emissions from the TOCDF BRA are expected to be very similar to the JACADS BRA air emissions and, therefore, significantly below the EPA emission limits for particulate, HCl, and the metals shown in Table 3-2. Potential pollutant emission rate estimates for the BRA baghouse are presented in Table 3-2. In addition, Table 3-1 presents the calculated composition of the particulate.

3.4 Operating Standards

Section 2.2 contains detailed operation procedures for the BRA evaporator packages and drum dryers, and Section 2.6 describes the procedures used to reduce the potential of a spill or other problems. Section 2.3 discusses the monitoring program for brine treatment, including information on the monitoring conducted by local operators, as well as the automatic systems. This monitoring is conducted to detect problems such as unacceptably high or low liquid level, pressure, temperature, or feed rate.

3.5 Site Hydrologic Conditions

The TOCDF is located in the Rush Valley of Tooele County. The Rush Valley is an elongated, north-south oriented, intermountain basin located between the Oquirrh Mountains to the east and the Stansbury and Onaqui Mountains to the west. Rush Valley is located in the eastern Basin and Range physiographic province, and is representative of intermountain basins within the province. Rush Valley is partially filled with alluvial sediments and lake beds. Geologic formations in the vicinity consist of Paleozoic sedimentary rock, along with gravel, sand, and clay. The site is located near the base of the Oquirrh Mountains, where the land surface consists of relatively porous colluvial and alluvial deposits, containing sand and gravel, with some conglomerate and clay.

3.5.1 Local Well Information and Groundwater Conditions

Groundwater occurs in three distinct aquifers in Rush Valley. The most extensive aquifer is the basin-fill aquifer. The overlying, relatively impermeable, clay-sized lacustrine sediments confine this aquifer, and restrict hydraulic communication between it and the playa surfaces. The sand and gravel of the alluvial fans along the flanks of the mountains compose the second, alluvial-fan aquifer. The highest quality groundwater obtainable in Rush Valley is contained in this aquifer. The third is unconfined, shallow-brine aquifer, which lies just below the valley surface. Groundwater quality in the Rush Valley ranges from fresh to briny.

Ground water levels had exhibited a generally rising trend between 1982 and 1987. This can be directly attributed to an increase in annual precipitation. Recharge to Rush Valley is almost entirely provided by rainfall and snow melt from the surrounding mountains. The basin-fill aquifer is recharged by subsurface inflow from adjacent alluvial fans and underlying Tertiary or Paleozoic rocks.

Emission Rate Calculation Worksheet - BRA Baghouse

Location/Source Number **TOCDF/A20**

Building Name:	**PUB**	**Operating hours PTE:**	**7488**
Description:	**Brine Reduction Area Baghouse**	**Operating hours actua**	**NA**
Air Management #:	**ATPUBF01**		
Flow Rate (dscfm):	**23683**		
		UTM Easting (km) :	**385.352**
		UTM Northing (km):	**4462.228**

Emission Rate Information:

Pollutant	Potential Emissions			Actual Emissions		
	lb/hr	lb/yr	ton/yr	lb/hr	lb/yr	ton/yr
Particulate	1.89	14152	7.08	0	0	0
PM-10	1.51	11321	5.66	0	0	0
Antimony	2.50E-05	1.87E-01	9.36E-05	0	0	0
Arsenic	3.90E-05	2.92E-01	1.46E-04	0	0	0
Barium	2.30E-04	1.72E+00	8.61E-04	0	0	0
Beryllium	2.50E-05	1.87E-01	9.36E-05	0	0	0
Cadmium	3.09E-05	2.31E-01	1.16E-04	0	0	0
Chromium	6.81E-05	5.10E-01	2.55E-04	0	0	0
Lead	1.74E-04	1.30E+00	6.51E-04	0	0	0
Mercury	3.72E-05	2.79E-01	1.39E-04	0	0	0
Selenium	2.50E-05	1.87E-01	9.36E-05	0	0	0
Silver	2.50E-05	1.87E-01	9.36E-05	0	0	0
Thallium	5.00E-05	3.74E-01	1.87E-04	0	0	0

Emission Rate Calculation Methodology:

PTE for Particulate (ton/yr) = TSP Emission Rate (gr/dscf) * Flow Rate (dscfm) * 0.00014 lb/grain * 60 min/hr / 2000 lb/ton

PTE for PM-10 (ton/yr) = PM-10 Emission Rate (gr/dscf) * Flow Rate (dscfm) * 0.00014 lb/grain * 60 min/hr / 2000 lb/ton

Flow Rate conversion from acfm to dscfm = acfm * Pa/(29.9) * (460+68)/460+Ts * (100-w)/ 100

Assumptions:

General

Particulate emission rate of 0.0095 gr/dscf and PM-10 emission rate of 0.0076 gr/dscf are based on BACT TSP information(PM-10 = 80% TSP
The following information was assumed for the flow rate conversion: inlet loading to baghouse = 0.862 gr/dscf; elevation = 5320 ft; stack temp.
250F; % water by volume (w) = 27%; and maximum flow rate from baghouse = 53068 acfm.
Metal emissions taken from JACADS BRA EPA Compliance Test Report March 1994 Volume 1 Tables 3.5 & 3.6

Actual Emissions

NA.

Potential to Emit

Based on 24-hour/day, 6 day/week and 52 weeks/year operation (7488 hr/yr).

Table 3-2
Emission Rate Estimate for BRA Baghouse

A southwest-to-northwest trending groundwater divide, which passes through the Tooele Chemical Activity, separates the flow of groundwater in Rush Valley into two distinct regions. Liquid discharges entering the ground water beneath the Tooele Chemical Activity can flow either toward south Mountain or the Thorpe Hills, depending upon which side of the divide they enter the aquifer.

3.5.2 Evaluation of Potential Groundwater Contamination

To minimize the potential for soil and ground water contamination, the majority of the TOCDF is covered with impermeable surfaces (buildings, asphalt, and concrete pavement). A storm water drainage system directs run off to a storm water detention pond. Further, all brine reduction operations occur within an enclosed building, and brines to be treated are fed through piping from tanks located adjacent to the PUB.

3.6 Site Precipitation

The area in which the site is located is arid to semi-arid. The 100 year 24 hour precipitation event is less than 3.3 inches. Normal annual precipitation is about 11 inches and is distributed fairly evenly throughout the year. Annual snow fall in the area is about 40 inches (approximately 4 inches of liquid precipitation).

3.7 Groundwater Usage

Recharge to Rush Valley is provided almost entirely by rainfall and snow melt from the surrounding mountains. Groundwater is discharged by wells, evapotranspiration, and subsurface outflow. The majority of the water pumped from wells is used for agricultural purposes.

3.8 Surface Waters

3.8.1 Topography

Drawings TE-16-C-2 and TE-16-C-3 in Attachment 1 of the TOCDF RCRA Permit are topographic maps of the plant site and the local surrounding area. Drainage for the facility is westerly. The low area is more than 100 feet lower in elevation, and more than 10,000 feet from the facility. The overall drainage gradient for the TOCDF is 1 percent or greater. The topography is generally smooth and uniform, allowing no chance for ponding or pooling of runoff waters. Natural drainage channels exist and do not direct water onto the facility.

The TOCDF area is largely covered by impermeable surfaces (for example, buildings, asphalt, and concrete paving). Runoff from the TOCDF is controlled by the slope of the asphalt and concrete pavement towards storm drains, ditches, and culverts within the TOCDF. All onsite surface runoff is collected in an underground drainage system and routed to the storm drain detention pond. The pond is sized for the 100 year storm. Types and amounts of precipitation are discussed in Section 3.6. No surface waters are used as public water supplies in the immediate vicinity of TOCDF. Surface water is used primarily for agricultural purposes in Rush Valley.

3.8.2 Run on/Runoff

The TOCDF is located on a hill overlooking Rush Valley and is virtually devoid of surface water features or intermittent streams. No major rivers flow within a 62 miles radius of the TOCDF. The access road to the North and East acts as a barrier to divert runoff from higher elevations. Figure 3-2, 3-3, and 3-4, which are drawings TE-16-C-32,-33 and-34, detail the storm drainage features of the Tooele Chemical Activity.

Contamination of surface water in the vicinity of the BRA is precluded by the location and design of the BRA. The brines are processed through an enclosed treatment system inside the PUB, and the solids generated are collected in containers which preclude contact between the waste and any run on/runoff. Only the BRA PAS is located outside of the PUB, and its primary purpose is to manage gaseous emissions. All solids from the BRA PAS are collected and stored in enclosed containers. Containment systems and detailed descriptions of the evaporator packages and the drum dryers are provided in Sections 3.2 and 2.1. Brine is fed through steel piping and treated in equipment located indoors. Brine and brine salts are protected from run on and will not, therefore, generate runoff. There is little potential impact to surface waters from the BRA.

3.9 Area Land Use

The BRA is located on the Tooele Chemical Activity, which is a restricted government facility. Drawing TE-16-C-2 in Attachment 11 shows the location of the Tooele Chemical Activity in relation to surrounding communities and highways. All of the land use in the Tooele Chemical Activity is for storage and disposal of military equipment and munitions, waste management, and other activities associated with the Tooele Chemical Activity and Program Manager for Chemical Demilitarization (PMCD) missions. The TOCDF is located in the North Central portion of the Tooele Chemical Activity, and the BRA is located inside the PUB within the TOCDF area (See DWG TE-16-C-2 in Attach. 11).

The closest public highways to the TOCDF are County Road 198 and State Highway 73, which are over a mile away from the TOCDF perimeter fence. Additional information concerning traffic in the area is provided in Attachment 1, Section 1.4, of the TOCDF RCRA Permit.

There are 11 communities located within 50 km (30 miles) of the site: Grantsville, Erda, Tooele, Stockton, Onaqui, St. John, Clover, Ophir, Mercur, Faust, and Vernon. The city of Tooele has the largest population of these communities. It is located approximately 20 km away from the TOCDF and had a population of 13,887 in 1990. According to the 1990 census, there are 26,601 residents of Tooele County. The population of Tooele County has increased by only 568 people between 1980 and 1990. The population distribution from the 1986 data should be accurate in showing where the major population centers are in relation to TOCDF.

Figure 3-2
Chemical Stockpile Disposal Program
Site Work
Storm Drainage Plan
Area 1
TE-16-C-32

Figure 3-3
Chemical Stockpile Disposal Program
Site Work
Storm Drainage Plan
Area 2
TE-16-C-33

Figure 3-4
Chemical Stockpile Disposal Program
Site Work
Storm Drainage Plan
Area 3
TE-16-C-34

Land use within the surrounding area is dominated by livestock grazing. This is due in part to the geographic location of the region, which becomes a natural shelter for grazing animals during the winter. Beef cattle leads as the primary livestock, followed by sheep.

Cropland accounts for only a minute fraction of the agricultural land use around Tooele Chemical Activity. Only 2.9% of the Basin has been cultivated for growing crops. Crops grown in the area include wheat, barley, corn, oats, and alfalfa. Since rainfall in the valley is limited, irrigation is a common practice among the agricultural sector. Water is obtained from nearby streams and water storage reservoirs.

3.10 Migration of Waste Constituents

There is minimal potential for release of waste constituents from the BRA into subsurface physical structures, the environment, or the root zone of food chain crops or other vegetation. Brines are confined by piping, evaporator packages, drum dryers, and ancillary equipment. The brines are sampled and analyzed for pH to ensure the waste is compatible with these BRA systems. This mitigates the potential for a waste release caused by deterioration of the primary containment system.

Should a spill or leak occur from the BRA equipment, the released waste would be contained inside the PUB. The BRA floor area provides an adequate containment volume of 12,000 gallons. Operations personnel regularly inspect the collection containers, so that a spill would be readily detected and mitigated in accordance with the Contingency Plan. Since spills that may occur in the BRA are contained within an enclosed structure, the released waste is prevented from coming into contact with soil. Migration of wastes into the subsurface or groundwater is, therefore, prevented.

The PUB, as an enclosed building, prevents run on and precipitation from contacting equipment and potentially generating contaminated runoff. No liquid waste will be discharged from the BRA or the PUB. Only the BRA PAS is exposed to the elements, and the BRA PAS only handles a gaseous waste stream. Gaseous effluent from the BRA is controlled by the BRA PAS and will be managed under the air permit and RCRA.

3.11 Evaluation of Risk to Human Health And The Environment

Section 3.10 evaluates the potential for release of waste constituents from the BRA to environmental media surrounding the TOCDF. Based on the analysis presented, no release of solid or liquid waste constituents to the environment is anticipated. As noted in that section, the evaporator packages and drum dryers are located within the PUB, a fully enclosed and contained structure. Any leaks that might occur are contained within the PUB. There will be no discharge or release of waste constituents to soil, surface water, or groundwater.

Given this information, no exposure to human or non-human receptors by liquid and solid waste from normal operation of the BRA and BRA PAS is anticipated. Therefore, there would be no risk of adverse effects to offsite receptors associated with the generation or handling of these materials. Wastes that pose an inherent physical threat to the BRA or a safety hazard for the operators are not processed through the BRA. Wastes that are incompatible with BRA systems or containers are not accepted. Physical damage to the structural components of the TOCDF is very unlikely.

Atmospheric emissions will result from normal operation of the BRA. Gaseous effluent is exhausted from the evaporators and the drum dryers to the BRA PAS, which is designed to remove particulates from the gas stream and collect them for subsequent disposal. After the particulates are removed, the gas stream is released via the BRA PAS stack to the atmosphere. The resultant effluent gases will contain acceptable levels of particulates, SO_2, NO_x, and CO.

In summary, the TOCDF BRA and BRA PAS have been designed and built to ensure compliance with the requirements of the RCRA regulations and the CAA permit. No adverse impacts to human health or the environment are projected to be associated with the release of waste constituents to the atmosphere from the BRA and BRA PAS.

4. REFERENCES

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ATTACHMENTS

ATTACHMENT 15-1

LIST OF ACRONYMS

LIST OF ACRONYMS

acfm	Actual Cubic Feet Per Minute
AQCR	Air Quality Control Region
ASME	American Society Of Mechanical Engineers
AWFCO	Automatic Waste Feed Cutoff
BRA	Brine Reduction Area
BRA PAS	Brine Reduction Area Pollution Abatement System
CAMDS	Chemical Agent Munitions Disposal System
cfm	Cubic Feet Per Minute
CFR	Code of Federal Regulations
DAAMS	Depot Area Air Monitoring System
DFS	Deactivation Furnace System
dscf	Dry Standard Cubic Feet
EPA	Environmental Protection Agency
gpm	Gallons Per Minute
gr/dscf	Grains Per Dry Standard Cubic Foot
HCl	Hydrochloric Acid
HEPA	High Efficiency Particulate Air
hp	Horse Power
HRA	Health Risk Assessment
ID	Induced Draft
in wc	Inches of Water Column
JACADS	Johnston Atoll Chemical Agent Disposal System
kw	Kilowatt
LIC	Liquid Incinerators
MMBTU/hr	Million British Thermal Units Per Hour
MPF	Metal Parts Furnace
NAAQS	National Ambient Air Quality Standards
PAS	Pollution Abatement Systems
PDARS	Process Data Acquisition And Recording System
PCBs	Polychlorinated Biphenyls
PM	Particulate Matter
ppb	Parts Per Billion
ppm	Parts Per Million
rpm	Revolutions Per Minute
psi	Pounds Per Square Inch
psig	Pounds Per Square Inch Gage
PUB	Process and Utilities Building
RCRA	Resource Conservation And Recovery Act
RHA	Residue Handling Area
scfm	Standard Cubic Feet Per Minute

LIST OF ACRONYMS

TSCA	Toxic Substances Control Act
TSP	Total Suspended Particulate
TOCDF	Tooele Chemical Agent Disposal Facility
TWA	Time Weighted Average
UBC	Uniform Building Code
UPS	Uninterruptible Power Supply
WAP	Waste Analysis Plan

ATTACHMENT 15-2

RCRA Drawings of BRA and BRA PAS

These Drawings Are Located in Attachment 11 of the RCRA Permit.

BRA AND BRA PAS DRAWINGS

TE-2-D-501	BRINE SURGE TANKS & PUMPS - LINE 1 PIPING & INSTRUMENT DIAGRAM
TE-2-D-502	BRA EVAPORATOR - LINE 1 PIPING & INSTRUMENT DIAGRAM
TE-2-D-503	BRA DRUM DRYER - LINE 1 PIPING & INSTRUMENT DIAGRAM
TE-2-D-504	BRA DRUM DRYER - LINE 1 PIPING & INSTRUMENT DIAGRAM
TE-2-D-505	BRA PAS BURNER & MANIFOLD PIPING & INSTRUMENT DIAGRAM
TE-2-D-511	BRINE SURGE TANKS & PUMPS - LINE 2 PIPING & INSTRUMENT DIAGRAM
TE-2-D-512	BRA EVAPORATOR - LINE 2 PIPING & INSTRUMENT DIAGRAM
TE-2-D-513	BRA DRUM DRYER - LINE 2 PIPING & INSTRUMENT DIAGRAM
TE-2-F-501	BRA FIRST TRAIN PROCESS FLOW DIAGRAM
TE-2-F-502	BRA SECOND TRAIN PROCESS FLOW DIAGRAM
TE-27-G-501	MAJOR EQUIPMENT LEGEND & FLOOR PLAN GENERAL ARRANGEMENT
TE-2-P-501	BRINE REDUCTION AREA 2-4 PIPING PLAN
TE-2-P-503	BRINE REDUCTION AREA 2-4 PIPING SECTIONS
TE-2-S-5	PUB FLOOR SLAB PLAN
TE-16-S-16	SITE WORK, BRA TANK FOUNDATIONS

ATTACHMENT 15-3

Agent Monitoring Plan

Reference is made to the TOCDF Agent Monitoring Plan. A controlled copy of this document is on file at the Utah Department of Environmental Quality, Division of Solid and Hazardous Waste.

ATTACHMENT 15-4

Environmental Inspection Requirements and Logs

The environmental inspection requirements and logs listed below are found in Attachment 5 of the RCRA Permit.

Environmental Inspection for the Brine Reduction Area Storage Tanks, BRA-TANK-101, BRA-TANK-102, BRA-TANK-201, BRA-TANK -202, & Secondary Containment System

Environmental Inspection Log for the Brine Reduction Area Surge Tanks

Environmental Inspection for the Brine Reduction Area Evaporators, Heat Exchangers, & Drum Dryers, BRA-EXCH-101, BRA-EXCH-201, BRA-EVAP-101, BRA-EVAP-201, BRA-DDYR-101, BRA-DDYR-102, BRA-DDYR-201, & Secondary Containment Systems

Environmental Inspection Log for the Brine Reduction Area Evaporators, Heat Exchangers, & Drum Dryers

Environmental Inspection for the Brine Reduction Area Pollution Abatement System

Environmental Inspection Log for the Brine Reduction Area Pollution Abatement System